the direction of the beam traveling after being reflected. Hence, a dispersion compensation amount will change as the mirror face shape is changed and the direction of the reflected beam changes.

With regard to an optical communications network, the dispersion amount of an optical signal varies from one network link to another, as, for instance, the associated transmission or the associated optical fiber composition varies from one link to another. As the ambient temperature of an equipment changes or an aged part of an optical fiber connection is renewed, the dispersion amount of the associated link will change. Accordingly, it is advantageous to have a dispersion compensator of which the compensation amount is variable and the associated maximum compensation amount is large.

To cater for this requirement, conventional systems provide a non-spherical mirror of which the face gradually changes from convex to concave region is mounted on a stage and moved to various positions to cover a wide range of the compensation amount. Alternatively, in the case of Cao, several differently shaped mirrors are provided.

According to Cao, a fixed number of variety mirrors are provided (See FIGS. 68 and 69) from which an optimum one is selected for use. In addition, Cao offers a configuration in which a plurality of mirrors is assembled in a certain order and rotating the assembly to switch from one mirror to another as it becomes necessary (See FIGS. 71-73).

In contrast, according to the present invention, the mirror being not fixedly prepared is assumed to be adjusted to each requirement, and, hence, it can provide the most suitable compensation to a communication route of any kind. The compensator, according to an aspect of the present invention, allows coping with dispersion amount changes caused by temperature changes outside of those assumed at the time of installing the compensator. It is considered an important advantage to have a mirror of which the shape is adjustable or variable to suit to any required form, which is the feature associated with the present invention. Cao fails to teach or suggest "a surface-shape variable mirror unit returning the angular dispersed beams to the angular dispersion unit and comprising a transformable surface shape, wherein the wavelengths of the input beams are dispersed by reflecting the beams from the angular dispersion unit on the surface-shape variable mirror unit, inputting the reflected beams to the angular dispersion unit, and outputting the angular dispersed beams from the angular dispersion unit," as recited in independent claim 1. Specifically, Cao is associated with a method in which the shape of a mirror face is not variable. For this reason, the method calls for having a plurality of mirrors with

differently shaped faces and switch from one to another.

It would be impossible to provide one compensator with all the necessary mirror variations to accommodate compensation amounts that may be required in a scale associated with the worldwide networks. Furthermore, the compensator, in accordance with the present invention, avoids experiencing communication interruptions in correspondence to every switchover between mirrors at which a beam from the VIPA crosses a mirror joint. In contrast to the present invention, in systems where a larger number of mirrors is provided, the larger the size of the assembly becomes and requires a more complex operation.

It is respectfully submitted that the present claimed invention patentably distinguishes over Cao and withdrawal of the rejection is requested to independent claim 1 and related dependent claims.

Page 4 of the Office Action rejects claim 3 under 35 U.S.C. § 103 over Cao et al. (6,343,866).

Claim 3 depends from independent claim 1. The arguments presented above supporting the patentability of independent claim 1 are incorporated herein. Accordingly, it is respectfully requested that independent claim 1 and related dependent claims be allowed.

According to the Office Action, "it would have been obvious to one having ordinary skill in the art at the time the invention was made to employ a thin plate, the elasticity to make the mirror, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice". In In re Garrett, 1986 Pat. App. LEXIS 8 (Bd. Pat. App. 1986), the U.S. Patent and Trademark Office Board of Patent Appeals and Interferences ("Board") reversed an examiner's rejection that was based upon similar grounds. The Board stated:

> [T]he examiner has not presented any line of reasoning as to why the artisan would have been motivated to so modify the ... structure, and we know of none. The examiner's assertion ... that the proposed modification would have been "an obvious matter of engineering design choice well within the level of skill of one of ordinary skill in the art" is a conclusion, rather than a reason.

According to In re Garrett, the Board has repeatedly held that a finding of obviousness requires that the prior art provide a motivation for one skilled in the art to make the necessary changes to the reference device. See, e.g., In re Chicago Rawhide Mfg. Co., 223 USPQ 351, 353 (Bd. Pat. App. 1984). Furthermore, the Federal Circuit has further noted that obviousness is

determined by the totality of the record. Thus, in the present case the Office Action has improperly stated a conclusion rather than a reason for the conclusion. It is respectfully asserted that the Examiner's belief that the limitation in question is an obvious design choice is not a sufficient basis for determining that the limitation would have been obvious to one of ordinary skill in the art. As demonstrated by the cases cited above, such a conclusion is clearly improper where there has been no demonstration that the prior art provides a motivation for one skilled in the art to make the necessary changes to a reference device.

CONCLUSION:

In accordance with the foregoing, it is respectfully submitted that all outstanding objections and rejections have been overcome and/or rendered moot, and further, that all pending claims patentably distinguish over the prior art. Thus, there being no further outstanding objections or rejections, the application is submitted as being in condition for allowance, which action is earnestly solicited.

If the Examiner has any remaining issues to be addressed, it is believed that prosecution can be expedited by the Examiner contacting the undersigned attorney for a telephone interview to discuss resolution of such issues.

If there are any underpayments or overpayments of fees associated with the filing of this Amendment, please charge and/or credit the same to our Deposit Account No. 19-3935.

Respectfully submitted,

STAAS & HALSEY LLP

Date: February 6, 2003

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS:

Please AMEND claims 1-5. The remaining claims are reprinted, as a convenience to the Examiner, as they presently stand before the U.S. Patent and Trademark Office.

1. (ONCE AMENDED) A variable wavelength dispersion compensator, comprising:

an angular dispersion unit [giving] angular dispersing [dispersion to] a plurality of [the] wavelengths of input beams; and

a surface-shape variable mirror unit returning the [angle-dispersed] angular dispersed beams to the angular dispersion unit[,] and comprising a transformable surface shape [of which can be transformed], wherein the wavelengths of the input beams are dispersed [dispersion is given to the beams] by reflecting the beams from the angular dispersion unit on the surface-shape variable mirror unit, inputting the reflected beams to the angular dispersion unit, [again] and outputting the angular dispersed [inputted] beams from the angular dispersion unit.

2. (ONCE AMENDED) The variable wavelength dispersion compensator according to claim 1, wherein said surface-shape variable mirror unit further comprises:

a mirror face unit reflecting beams; and

a plurality of stage units setting [a] the mirror face unit to a [desired] shape, which contacts a back surface of the mirror unit.

3. (ONCE AMENDED) The variable wavelength dispersion compensator according to claim 2, wherein said mirror face unit is a thin plate[,] comprising a variable [the] elasticity [of which can be changed].

4. (ONCE AMENDED) The variable wavelength dispersion compensator according to claim 1, further comprising:

a plurality of surface-shape variable mirror units; and

a branching unit branching the angular-dispersed beams into a plurality of beam groups with [a plurality of] different wavelengths, wherein the plurality of said surface-shape variable mirror units are provided and each surface shape is set [so that] where wavelength dispersion [can be] is compensated for each branched beam group.

5. (ONCE AMENDED) The variable wavelength dispersion compensator according to claim 4, wherein the plurality of said surface-shape variable mirror units are incorporated into [one] the surface-shape variable mirror unit, which [has a] comprises the transformable surface transformed in a two-dimensional direction so that each branched beam group [can be] is received on a part of the surface and a prescribed wavelength dispersion is given to the branched beam group.

6. (UNAMENDED) The variable wavelength dispersion compensator according to claim 4, wherein said branching unit is a diffraction grid.

7. (UNAMENDED) The variable wavelength dispersion compensator according to claim 4, wherein said branching unit is a VIPA.

CERTIFICATE UNDER 37 CFR 1.8(a)
I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Commissioner of Patents and Trademarks, Washington, D.C. 20231
on February 6 ,20 03
STAAS & HALSEY
By: Michael M. Nil
Date: February 6, 2003